

**WHAT IS CLAIMED IS:**

1        1 A telecommunications network wherein a user equipment unit (UE), using  
2 one of a cell or a current active set of base stations on a first frequency, maintains a  
3 virtual active set of base stations on a second frequency, whereby the user equipment  
4 unit (UE) can switch to the virtual active set of base stations when frequency  
5 measurements made at the user equipment unit (UE) so warrant.

1        2. The network of claim 1, wherein the frequency measurements made at the  
2 user equipment unit (UE) are triggered either periodically, immediately, or in response  
3 to a predetermined event.

1        3. The network of claim 1, wherein in response to a measurement trigger  
2 criteria, the user equipment unit (UE) performs and reports inter-frequency  
3 measurements for the second frequency.

1        4. The network of claim 3, the measurement trigger criteria which causes the  
2 user equipment unit (UE) to perform and report inter-frequency measurements for the  
3 second frequency is the same criteria which is employed to cause the user equipment  
4 unit (UE) to perform and report intra-frequency measurements for the first frequency.

1        5. The network of claim 3, wherein the measurement trigger criteria is one of  
2 being periodically, immediate, or in response to a predetermined event.

1        6. The network of claim 1, wherein when the frequency measurements made at  
2 the user equipment unit (UE) so warrant, the network issues an inter-frequency  
3 handover command to the user equipment unit (UE) so that the user equipment unit  
4 (UE) switches to the virtual active set of base stations.

1        7. The network of claim 1, wherein the network provides information regarding  
2 the virtual active set of base stations on the second frequency in a measurement control  
3 message.

1        8. The network of claim 7, wherein the measurement control message is  
2 included in a DCCH control channel.

1        9. The network of claim 7, wherein the measurement control message further  
2 includes one of a measurement parameter to be measured and a predetermined  
3 measurement event which triggers a measurement.

1        10. The network of claim 1, wherein the network provides at least one member  
2 of the virtual active set of base stations on the second frequency in a virtual active set  
3 update procedure.

1        11. The network of claim 1, wherein the network sends the user equipment unit  
2 (UE) an authorization message that allows the user equipment unit (UE) to  
3 autonomously update the virtual active set of base stations when the frequency  
4 measurements made at the user equipment unit (UE) so warrant

1        12. The network of claim 11, wherein the authorization message specifies one of  
2 an event or a parameter that can trigger the update of the virtual active set of base  
3 stations without the user equipment unit (UE) first having to send a measurement report  
4 to the network.

1        13. The network of claim 1, wherein the virtual active set of base stations on the  
2 second frequency is maintained by a second operator which differs from a first operator  
3 which maintains the current active set of base stations on the first frequency.

1        14. The network of claim 1, wherein the virtual active set of base stations on the  
2 second frequency comprises a second network system which differs from a first  
3 network system provided on the first frequency.

1        15. The network of claim 14, wherein the second network system is universal  
2 mobile telecommunications (UMTS) and the first network system is a Global System  
3 for Mobile (GSM) system.

1        16. The network of claim 14, wherein the second network system is a system  
2 having soft intra-frequency handover and the first network system is universal mobile  
3 telecommunications (UMTS).

1        17. The network of claim 1, wherein the network utilizes a frequency quality  
2 estimate to determine when frequency measurements made at the user equipment unit  
3 (UE) warrant the switch to the virtual active set of base stations.

1        18. The network of claim 17, wherein the frequency quality estimate is provided  
2 by Equation 1.

1        19. The network of claim 17, wherein the frequency quality estimate is based on  
2 two factors: (1) a carrier Radio Signal Strength Indication (RSSI); and (2) whether the  
3 Base Transceiver Station Identity Code/Base Station Identifier Code (BSIC) has been  
4 confirmed or not.

1        20. The network of claim 17, wherein the network compares the frequency  
2 quality estimate to at least one threshold to determine when frequency measurements  
3 made at the user equipment unit (UE) warrant the switch to the virtual active set of base  
4 stations.

1        21. The network of claim 20, wherein the at least one threshold is chosen to  
2 provide hysteresis protection..

1        22. A telecommunications network wherein a user equipment unit (UE), using  
2 one of a cell or a current active set of base stations on a first frequency, maintains a  
3 virtual active set of base stations on a second frequency, whereby the user equipment  
4 unit (UE) can switch to the virtual active set of base stations when frequency  
5 measurements made at the user equipment unit (UE) so warrant; and wherein the virtual  
6 active set of base stations on the second frequency is maintained by a second operator  
7 which differs from a first operator which maintains the current active set of base  
8 stations on the first frequency.

10        23. The network of claim 22, wherein the network utilizes a frequency quality  
11 estimate to determine when frequency measurements made at the user equipment unit  
12 (UE) warrant the switch to the virtual active set of base stations.

1        24. The network of claim 23, wherein the frequency quality estimate is provided  
2 by Equation 1.

1        25. The network of claim 23, wherein the frequency quality estimate is based on  
2 two factors: (1) a carrier Radio Signal Strength Indication (RSSI); and (2) whether the  
3 Base Transceiver Station Identity Code/Base Station Identifier Code (BSIC) has been  
4 confirmed or not.

1        26. The network of claim 23, wherein the network compares the frequency  
2 quality estimate to at least one threshold to determine when frequency measurements  
3 made at the user equipment unit (UE) warrant the switch to the virtual active set of base  
4 stations.

1        27. The network of claim 26, wherein the at least one threshold is chosen to  
2 provide hysteresis protection.

1        28. A telecommunications network wherein a user equipment unit (UE), using  
2 one of a cell or a current active set of base stations on a first frequency, maintains a  
3 virtual active set of base stations on a second frequency, whereby the user equipment  
4 unit (UE) can switch to the virtual active set of base stations when frequency  
5 measurements made at the user equipment unit (UE) so warrant; and wherein the virtual  
6 active set of base stations on the second frequency comprises a second network system  
7 which differs from a first network system provided on the first frequency.

1        29. The network of claim 28, wherein the network utilizes a frequency quality  
2 estimate to determine when frequency measurements made at the user equipment unit  
3 (UE) warrant the switch to the virtual active set of base stations.

1        30. The network of claim 29, wherein the frequency quality estimate is provided  
2 by Equation 1.

1        31. The network of claim 29, wherein the frequency quality estimate is based on  
2 two factors: (1) a carrier Radio Signal Strength Indication (RSSI); and (2) whether the  
3 Base Transceiver Station Identity Code/Base Station Identifier Code (BSIC) has been  
4 confirmed or not.

1        32. The network of claim 29, wherein the network compares the frequency  
2 quality estimate to at least one threshold to determine when frequency measurements  
3 made at the user equipment unit (UE) warrant the switch to the virtual active set of base  
4 stations.

1        33. The network of claim 32, wherein the at least one threshold is chosen to  
2 provide hysteresis protection.

1        34. The network of claim 28, wherein the second network system is universal  
2 mobile telecommunications (UMTS) and the first network system is a Global System  
3 for Mobile (GSM) system.

1        35. The network of claim 28, wherein the second network system is a system  
2 having soft intra-frequency handover and the first network system is universal mobile  
3 telecommunications (UMTS).

1 *Sub A4* > 36. A method of operating a telecommunications network comprising:  
2        a user equipment unit (UE) using one of a cell or a current active set of base  
3        stations on a first frequency;  
4        maintaining a virtual active set of base stations on a second frequency;  
5        the user equipment unit (UE) switching to the virtual active set of base stations  
6        when frequency measurements made at the user equipment unit (UE) so warrant.

1        37. The method of claim 36, further comprising triggering the frequency  
2        measurements made at the user equipment unit (UE) either periodically, immediately, or  
3        in response to a predetermined event.

1       38. The method of claim 36, further comprising the user equipment unit (UE)  
2 performing and reporting inter-frequency measurements for the second frequency in  
3 response to a measurement trigger criteria.

1       39. The method of claim 38, wherein the measurement trigger criteria which  
2 causes the user equipment unit (UE) to perform and report inter-frequency  
3 measurements for the second frequency is the same criteria which is employed to cause  
4 the user equipment unit (UE) to perform and report intra-frequency measurements for  
5 the first frequency.

1       40. The method of claim 38, wherein the measurement trigger criteria is one of  
2 being periodically, immediate, or in response to a predetermined event.

1       Sub  
A3 } 41. The method of claim 36, further comprising, when the frequency  
2 measurements made at the user equipment unit (UE) so warrant, the network issuing an  
3 inter-frequency handover command to the user equipment unit (UE) so that the user  
4 equipment unit (UE) switches to the virtual active set of base stations.

1       42. The method of claim 36, further comprising the network providing  
2 information regarding the virtual active set of base stations on the second frequency in a  
3 measurement control message.

1       43. The method of claim 42, further comprising including the measurement  
2 control message in a DCCH control channel.

1       44. The method of claim 42, further comprising including in the measurement  
2 control message further one of a measurement parameter to be measured and a  
3 predetermined measurement event which triggers a measurement.

1       45. The method of claim 36, further comprising the network providing at least  
2 one member of the virtual active set of base stations on the second frequency in a virtual  
3 active set update procedure.

*Sub A* 46. The method of claim 36, further comprising the network sending the user equipment unit (UE) an authorization message that allows the user equipment unit (UE) to update autonomously the virtual active set of base stations when the frequency measurements made at the user equipment unit (UE) so warrant.

1 47. The method of claim 46, further comprising specifying in the authorization  
2 message one of an event or a parameter that can trigger the update of the virtual active  
3 set of base stations without the user equipment unit (UE) first having to send a  
4 measurement report to the network.

1 48. The method of claim 36, further comprising: maintaining the virtual active  
2 set of base stations on the second frequency by a second operator which differs from a  
3 first operator which maintains the current active set of base stations on the first  
4 frequency.

1 49. The method of claim 36, wherein the virtual active set of base stations on the  
2 second frequency comprises a second network system which differs from a first  
3 network system provided on the first frequency.

1 50. The method of claim 49, wherein the second network system is universal  
2 mobile telecommunications (UMTS) and the first network system is a system having  
3 soft intra-frequency handover.

1 51. The method of claim 49, wherein the second network system is a Global  
2 System for Mobile (GSM) system and the first network system is universal mobile  
3 telecommunications (UMTS).

*Sub A* 52. The method of claim 36, further comprising using a frequency quality  
1 estimate to determine when frequency measurements made at the user equipment unit  
2 (UE) warrant the switch to the virtual active set of base stations.

1 53. The method of claim 52, wherein the frequency quality estimate is provided  
2 by Equation 1.

1        54. The method of claim 52, wherein the frequency quality estimate is based on  
2 two factors: (1) a carrier Radio Signal Strength Indication (RSSI); and (2) whether the  
3 Base Transceiver Station Identity Code/Base Station Identifier Code (BSIC) has been  
4 confirmed or not.

1        55. The method of claim 52, wherein the network compares the frequency  
2 quality estimate to at least one threshold to determine when frequency measurements  
3 made at the user equipment unit (UE) warrant the switch to the virtual active set of base  
4 stations.

1        56. The method of claim 55, wherein the at least one threshold is chosen to  
2 provide hysteresis protection.

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